ACCESSION #: 9905190249

NON-PUBLIC?: N

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Braidwood Station Unit 2 PAGE: 1 OF 5

DOCKET NUMBER: 05000457

TITLE: Unit 2 Generator and Subsequent Reactor Trip due to an

Spurious Generator Stator Ground Relay (GIX-104)

Actuation and Subsequent Rod Control Problems

EVENT DATE: 04/14/99 LER #: 99-001-00 REPORT DATE: 05/14/99

OTHER FACILITIES INVOLVED: NONE DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 86.5

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(i)

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Gordon Stellpflug TELEPHONE: (815) 458-2801

x-3207

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: TB COMPONENT: MEL MANUFACTURER: W

Card 588C

637G01

X AA MXR CP Clare

Relay HG3A-004

X AA 2AC W

Movable 6050D

Firing 12G01

Card

X AA Movable W

Phase 6050D

Control 11G01

Card

X AA Movable W

Reg. 1048F

Firing 56G01

Card

X AA Failure W

Detector 6050D

Card 15G01

REPORTABLE NPRDS: No

No

No

No

No

No

SUPPLEMENTAL REPORT EXPECTED: NO

EXPECTED SUBMISSION DATE: 05/14/99

ABSTRACT:

On 4/14/99 at 0433, the Braidwood Station Unit 2 reactor tripped due to a main generator and turbine trip. The generator trip was due to a spurious Generator Stator Ground Relay, GIX-104 relay, actuation. There was no identified personnel error or inappropriate action. The Digital Fault Recorder (DFR) records showed no evidence of a generator ground. The DFR showed a higher than normal third harmonic voltage before and after the reactor trip. The Sequence of Events Recorder (SER) showed two alarms, GIX-104 relay and voltage regulator, prior to the generator trip. A failed Minimum Excitation Limiter (MEL) card on the voltage regulator caused the card output to fail high raising the excitation of the generator. The plant equipment responded as designed, with the opening of the generator output breakers, tripping of the turbine, tripping of the reactor, and initiation of Auxiliary Feedwater.

On 4/15/99 during startup following these repairs, a Rod Control Urgent Failure alarm was received. This resulted in the Control Rod Drive System being incapable of control rod movement. The control rods remained trippable. During the repair efforts control banks C and D became misaligned such that the overlap limits were not met. Actions of Limiting Conditions of Operation (LCO) 3.1.6, "Control Bank Insertion Limits" , were entered due to the failure to meet the required overlap specified in the Core Operating Limits Report. Actions of LCO 3.1.6 requires verification of shutdown margin within 1 hour and that the overlap limits be met otherwise the unit must be placed in mode 2 with Keff< 1.0 within the next 6 hours. A Unit 2 shutdown was initiated to complete repairs due to the Control Rod Drive Systems, inability to move control rods. The shutdown was accomplished by opening the reactor trip breakers. The cause of the Control Rod Drive System failure is attributed to several card failures, which were subsequently identified and replaced. Following repairs to the Control Rod Drive System, the unit was returned to operation.

This event is being reported pursuant to 10CFR50.73(a)(2)(i) and 10CFR50.73(a)(2)(iv).

END OF ABSTRACT

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit(s):2 Event Date: 04/14/99 Event Time: 0433 hours

Reactor Mode(s): 1 Power Level(s): 86.5% RCS [AB]

Temp./Press.574 degrees

F/2235 psig

B. DESCRIPTION OF EVENT:

On 4/14/99 at 0433, the Braidwood Station Unit 2 reactor tripped due to a main generator and turbine trip. The generator trip was due to a spurious Generator Stator Ground Relay (TB), GIX-104 relay, actuation. There was no identified personnel error or inappropriate action. There were no systems or components inoperable at the beginning of this event that contributed to the severity of the event. The Digital Fault Recorder (DFR)(TB) records showed no evidence of a generator ground. Subsequent High Potential Testing of Main Generator did not identify any problems with the generator. The DFR showed a higher than normal third harmonic voltage before and after the reactor trip. The Sequence of Events Recorder (SER) showed two alarms, GIX-104 relay and voltage regulator, prior to

the generator trip. A failed Minimum Excitation Limiter (MEL)(TB) card on the voltage regulator caused the card output to fail high raising the excitation of the generator. The plant equipment responded as designed, with the opening of the generator output breakers, tripping of the turbine, tripping of the reactor, and initiation of Auxiliary Feedwater (BA). An Emergency Notification System (ENS) notification was made pursuant to 10CFR50.72(b)(2)(ii) on 4/14/99 for the Reactor Protection System -(JG) actuation.

Trouble shooting activities were performed on the voltage regulator. Every function of the voltage regulator was found acceptable except for the MEL

card function. The card had a failed setting potentiometer that caused the card output, and thus excitation, to fail high. The failed potentiometer showed signs of overloading and burning although all other components on the MEL card functioned as designed. The failed MEL card was replaced prior to returning Unit 2 back to service.

On 4/15/99 during reactor startup following these repairs, a Rod Control Urgent Failure alarm was received. This resulted in the Control Rod Drive System (AA) being incapable of control rod movement. The control rods remained trippable. At 0805 during subsequent repair activities, the control banks C and D became misaligned and failed to meet the overlap limit of 113 steps as required by the Core Operating Limits Report. This resulted in entry into actions of LCO 3.1.6 for Control Bank sequence or overlap limits not being met. Actions of LCO 3.1.6 requires verification of shutdown margin within 1 hour and that the overlap limits be restored within 2 hours, otherwise the unit must be placed in mode 2 with Keff< 1.0 within the next 6 hours. At 1005 Technical Specification action to be within mode 2 with Keff

At 1301 it was evident that the repair activities to the Rod Control System would continue beyond the Technical Specification limits and the Unit 2 shutdown was initiated. The reactor was taken to mode 3, Hot Standby, by opening the reactor the Reactor Trip Breakers. A second ENS notification was made pursuant to 10 CFR 50.72 (b)(1)(i)(a) for initiation of a shutdown as required by Technical Specifications at 1347 on 4/15/99. Following

repairs to the rod control system, the unit was returned to operation.

C. CAUSE OF EVENT:

The Braidwood Station Unit 2 reactor trip was due to the spurious GIX-104 Generator Stator Ground Relay actuation. The GIX-104 relay tripped the generator lockout relay, which opened the generator circuit breakers and the generator field breaker, transferred the auxiliary power to the Station Auxiliary Transformer (SAT)(EL) and tripped the turbine and the reactor.

The cause of the Control Rod Drive System Rod Control Urgent Failure Alarms resulted from multiple card failures including: Moveable Firing cards (AA), Moveable Phase Control card (AA), Moveable Regulation card (AA), and Failure Detector card (AA).

D. ASSESSMENT OF SAFETY CONSEQUENCES:

The safety consequences associated with this event are minimal. The plant responded as designed, and the reactor was placed in a subcritical state. No equipment failures occurred which complicated the post-trip response, and no fission product barriers were challenged. Had the event occurred under more limiting circumstances, e.g. with the reactor at full power and assuming a failure of a single train of the Reactor Protection System, the health and safety of the public would not have been adversely impacted. The plant is designed to withstand a trip from full power without challenging the principal fission product barriers. The failure of a single train of the Reactor Protection System would be mitigated by the

actuation of the redundant train of the Reactor Protection System. The plant is designed to withstand an initiating event concurrent with a single active failure of either the protection or mitigation systems. The Control Rod Drive System failure had no safety implications because the failure occurred at a low power level where core peaking limits are not challenged and the control rods remained trippable at all times.

E. CORRECTIVE ACTIONS:

Immediate actions were taken to verify proper response of the automatic protection systems following automatic actuation of a reactor trip, to assess plant conditions, and to identify the appropriate recovery procedure. When the unit was maintained in a stable condition a Reactor Trip Root Cause Determination was initiated.

Multiple corrective actions were identified with major efforts focusing on the failures of the MEL card, GIX relay, and the Control Rod Drive System cards. The corrective actions associated with the MEL Card failure are as follows:

o Develop a voltage regulator parts replacement program since the potentiometer failure on the MEL card could have been prevented if it had been replaced periodically.

o Establish continuous third harmonic recording capability in the switchyard.

o Test the Braidwood Unit 2 GIX-104 relay and a new replacement GIX-104

relay for effects of third harmonic voltages.

o The GIX relay was tested for susceptibility to third harmonics. The testing did not validate this susceptibility.

o The GIX relay was isolated for the remainder of the fuel cycle (i.e., approximately 5 days).

o The GIX relay was replaced during A2RO7.

o Confirmatory testing will be performed following restart from AR07.

Completed Main Generator High Potential Testing and no anomalies were identified.

Corrective actions associated with Control Rod Drive System card failures are as follows:

o A Dynamic Card Tester was used to identify and replace any out-of-tolerance or failed components.

o Upgraded Moveable Firing Cards.

o Replaced Moveable Firing Regulation (i.e., Gripper Card) and Phase Control Cards.

F. PREVIOUS OCCURRENCES:

No LER of previous similar events were found.

Commonwealth Edison Company

Braidwood Generating Station

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ComEd

May 14, 1999

U.S. Nuclear Regulatory Commission

ATTN: Document Control Desk

Washington, DC 20555-0001

Braidwood Station, Unit 2

Facility Operating License No. NPF-77

NRC Docket No. STN 50-457

Subject: Submittal of Licensee Event Report Number 99-001

The enclosed Licensee Event Report (LER) is being submitted in accordance with 10CFR50.73(a)(2)(i) and 10CFR50.73(a)(2)(iv). 10CFR50.73(a) requires an LER to be submitted within 30 days after discovery of the event.

Therefore, this report is being submitted by May 14, 1999.

Should you have any questions concerning this letter, please contact Mr. T. W. Simpkin at (815) 458-2801, extension 2980.

Respectfully,

Timothy J. Tulon

Site Vice President

Braidwood Station

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Enclosure: LER Number 99-001

cc: Regional Administrator - Region III

NRC Senior Resident Inspector - Braidwood Station

A Unicom Company

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